CLAIMS

What is claimed is:

1. A wafer cluster tool comprising:

a plurality of processing stations for processing wafers, each processing station further comprising

a process chamber,

a local clock coupled to the process chamber;

a master server in communication with the local clock in each processing station, the master server including

a master clock;

timetable software, wherein the timetable software records a local time for each clock in the plurality of processing stations.

2. The wafer cluster tool of claim 1, wherein each processing station further comprises:

a CPU coupled to the processing station, wherein the local clock coupled to the process chamber resides on the CPU;

3. The wafer cluster tool of claim 2 further comprising:

a local area network, wherein the master server is coupled to the CPU in each processing station via the local area network.

4. The wafer cluster tool of claim 3, further comprising:

a CPU coupled to the master server, wherein the master clock is resident on the CPU coupled to the master server.

5. The wafer cluster tool of claim 1, wherein the timetable software comprises a relational database.

6. The wafer cluster tool of claim 1, wherein the master server is coupled to the CPU in each processing station via the Internet.

7. The wafer cluster tool of claim 1, wherein the timetable software comprises a spreadsheet.

8. The wafer cluster tool of claim 7, wherein the timetable is updated in real-time.

9. The wafer cluster tool of claim 1, wherein the master server further includes scheduling software for the cluster tool.

10. The wafer cluster tool of claim 9, wherein the scheduling software includes a pre-determined schedule for the cluster tool.

11. The wafer cluster tool of claim 10, wherein the pre-determined schedule is periodic according to a fixed sending period.

12. The wafer cluster tool of claim 11, wherein the time recorded on the local clocks of each processing station is measured in units of the sending period.

13. A method for synchronizing a wafer cluster tool, the wafer cluster tool including a plurality of process modules, the method comprising:

a) generating a deterministic schedule for the wafer cluster tool, the deterministic schedule having a periodicity of a sending period;

b) loading a first wafer set into a first process module in the cluster tool according to the schedule;

c) in response to loading the first wafer set in the first process module, resetting a first local clock coupled to the first process module;

d) recording a first time from the first local clock in a timetable, the timetable coupled to the plurality of process modules, the first time measured in units of the sending period;

e) loading a second wafer set into a second process module in the cluster tool according to the schedule;

f) in response to loading the second wafer set in the second process module, resetting a second local clock coupled to the second process module;

g) recording a second time from the second local clock in the timetable in units of the sending period.

14. The method of claim 13, further comprising:

h) one sending period after the loading the first wafer set, loading a third wafer set into the first process module according to the schedule.

15. The method of claim 14, further comprising:

i) in response to loading the third wafer set, resetting the first local clock coupled to the first process module.

16. The method of claim 15, further comprising:

j) recording a third time from the first local clock in the timetable, the third time measured in units of the sending period.

17. A method for positioning a robot in a wafer cluster tool, the wafer cluster tool including a first process module, a second process module, and a third process module, the method comprising:

generating a deterministic schedule for the wafer cluster tool, the schedule having a periodicity defined by a sending period, wherein the schedule has a first pickup time for the first module in the cluster tool, and a second pickup time for the third module, the second pickup time occurring after the first pickup time, the deterministic schedule including a first instant and a second instant, wherein the first and second instants are separated by a time span equal to the sending period;

loading a first wafer in the cluster tool at the first instant;

picking up a second wafer from the first module with a robot, the picking up the second wafer occurring between the first and second instants;

delivering the second wafer from the first module to the second module with the robot before the second instant;

immediately after the delivering the second wafer, positioning the robot at the third module, the positioning the robot at the third model occurring before the second pickup time.

18. The method of claim 17 further comprising:

delivering the second wafer from the third module to a fourth module by use of the robot before the second instant.

19. The method of claim 18, wherein the robot is an inter bay transfer arm.

20. The method of claim 18, wherein the generating the schedule is done by a linear transformation.

21. The method of claim 18, wherein the generating the schedule is done by a genetic algorithm.

22. The method of claim 17, wherein the first module is coupled to a first local clock, the second module is coupled to a second local clock, the third module is coupled to a third local clock, and the fourth module is coupled to a fourth local clock.

23. The method of claim 17, wherein the first, second, third, and fourth modules are coupled by a local area network.

24. The method of claim 17, wherein the robot has only one gripper.

25. A method of positioning robots in a wafer cluster tool, the wafer cluster comprising a plurality of process modules, the wafer cluster including a first robot and a second robot, wherein the wafer cluster tool operates according to a periodic schedule, the periodic schedule being defined by a sending period, the method comprising:

a) transferring a first wafer from a first process module in the plurality of process modules to a second process module in the plurality of modules by use of the first robot;

b) immediately after step a, positioning the first robot at a third process module

c) transferring a second wafer from a third process module in the plurality of process modules to a fourth process module in the plurality of modules by use of the second robot;

d) immediately after step c, positioning the second robot at a fifth process module;

wherein steps a through d are conducted within a first time interval, the first time interval having a duration equal to the sending period.

26. The method of claim 25, wherein the first robot and the second robot each have only one gripper.